



NOV 16 2007

10CFR50.73

LR-N07- 0277

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington DC 20555-001

LER 311/07-003 -01  
Salem Nuclear Generating Station Unit 2  
Facility Operating License No. DPR-75  
NRC Docket No. 50-311

SUBJECT: Reactor Trip Due to Spurious Interlock

This Licensee Event Report (LER), "Reactor Trip Due to Spurious Interlock" is being supplemented to incorporate the results of the completed root cause evaluation. This report is submitted pursuant to the requirements of the Code of Federal Regulations 10CFR50.73(a)(2)(iv)(A).

The attached supplemental LER contains no commitments. Should you have any questions or comments regarding this submittal, please contact Mr. E. H. Villar at 856-339-5456.

Sincerely,

A handwritten signature in dark ink, appearing to read "G. Gellrich", is written over the typed name.

George H. Gellrich  
Plant Manager - Salem

Attachments (1)

JE22  
NRR

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C            Mr. S. Collins, Administrator - Region I  
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              USNRC Senior Resident Inspector - Salem (X24)

              Mr. P. Mulligan, Manager IV  
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## LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Salem Generating Station - Unit 2	2. DOCKET NUMBER 05000311	3. PAGE 1 OF 4
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## 4. TITLE Reactor Trip Due to Spurious Feedwater Interlock Signal

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	06	2007	2007	003	01	11	16	2007	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE  1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
10. POWER LEVEL  100%	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

## 12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Enrique Villar, Senior Licensing Engineer	TELEPHONE NUMBER (Include Area Code) 856-339-5456
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## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	JG	CBD	W120	Y					

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO

## 15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On August 6, 2007, the Salem Unit 2 reactor tripped due to 22 Steam Generator water level reaching its low low level set point. The cause of steam generator low low level was a faulty Solid State Protection System (SSPS) output driver card A517 that initiated a spurious feedwater interlock signal and resulted in the closure of the feedwater regulating valves.

It was determined that the failed circuit card was due to a defective solder joint. The root cause was attributed to inadequate post soldering test practices. The failed circuit card was replaced and the system tested satisfactorily. The test and inspection procedure for refurbished SSPS safety related circuit cards will be revised to include: (1) the use of soldering standards with inspections of both sides of the circuit card and (2) a manual test of the circuit card with agitation.

This report is being made in accordance with 10CFR50.73(a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

### PLANT AND SYSTEM IDENTIFICATION

Westinghouse – Pressurized Water Reactor (PWR/4)

Feedwater Steam Generator Level Control {JB/FCV}

Solid State Protection System {JG}(SSPS)

Solid State Protection System Circuit Card {JG/CBD}

\* Energy Industry Identification System {EIS} codes and component function identifier codes appear as {SS/CCC}

### IDENTIFICATION OF OCCURRENCE

Event Date: August 6, 2007

Discovery Date: August 6, 2007

### CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Operational Mode 1 at 100% reactor power.

No structures, systems or components were inoperable at the time that contributed to the event.

### DESCRIPTION OF OCCURRENCE

On August 6, 2007, Salem Unit 2 was operating at approximately 100% power steady state conditions. At 1311 hours, a reactor trip occurred as a result of the 22 Steam Generator (S/G) water level reaching its low low setpoint.

Control room personnel observed the overhead annunciator (OHA) D-24 "Feedwater Interlock" alarming and clearing several times immediately prior to the reactor trip without the associated valid inputs. This spurious Solid State Protection System {JG}(SSPS) feedwater interlock signal closed the feedwater regulating valves {JB/FCV} (21-24 BF19s). Closure of these valves interrupted the main feedwater flow to all steam generators, resulting in the low low steam generator level and subsequent reactor trip.

All safety systems responded as designed and the unit was stabilized in Mode 3. This report is being made in accordance with 10CFR50.73(a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

### PREVIOUS OCCURRENCES

Salem Unit 1 LER 272/2000-005-00 "Reactor Trip Due to a Failed Solid State Protection System (SSPS)" took place in 2000. The cause of this event was a defective SSPS output driver circuit card (A517). The root cause of this event was long-term exposure to an environment that caused corrosion on the leads and case material for the circuit card transistors. Long-term exposure to a corrosive environment was an industry issue that affected Motorola and RCA transistors manufactured prior to 1997. The corrective actions replaced the failed circuit card and established a SSPS circuit board refurbishment program to improve equipment reliability.

The corrective actions taken for the 2000 event were appropriate and would not have prevented this event. The failure of the SSPS circuit card reported in this LER is different than the one reported in 2000, as stated below.

### CAUSE OF OCCURRENCE

PSEG established a Root Cause Evaluation team to determine the cause of the reactor trip.

The direct cause of the reactor trip was a failed SSPS Train "A" output driver card A517 due to a defective solder joint. The defective solder joint was made during card refurbishment in September 2006 by PSEG maintenance. The technician who performed the solder joint was qualified and experienced, and performed the card refurbishment in accordance with established procedures and standards. Because soldering components on these circuit cards is difficult, PSEG relies on post soldering testing and inspection to detect flaws. The defective solder joint was not identified using the PSEG refurbishment test and inspection procedure, which is more stringent than industry standard. The card is located in cabinets behind the control room in a controlled environment that is not exposed to plant induced vibrations.

The root cause of the failed SSPS Train "A" output driver card A517 circuit card has been attributed to inadequate post soldering test practices in that the post soldering test and inspection was not comprehensive enough to identify the defective soldering.

### SAFETY CONSEQUENCES AND IMPLICATIONS

There were no safety consequences associated with this event.

The spurious feedwater interlock signal did not result in any safety related component being unavailable to perform as designed in the event of an accident. All safety related systems functioned as designed in response to the event.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02 did not occur.

NRC FORM 366A  
(1-2001)

U.S. NUCLEAR REGULATORY COMMISSION

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

**CORRECTIVE ACTIONS**

1. The safeguards output driver card A517 was replaced.
2. The Technical Specification required functional surveillance tests on SSPS Train "A" and "B" were satisfactory completed.
3. The SSPS refurbishment test and inspection procedure for SSPS safety related circuit cards will be revised to include the use of soldering standards with inspection of both sides of the circuit card, a manual functional testing with agitation, and component margin testing.

**COMMITMENTS**

No commitments are made in this LER.